Chapter 9 ROW Sheets

OVERVIEW

CONSTRUCT STATION AND OFFSET

The **F12** key runs a customized macro that is going to make it possible for us to construct points at a specific distance along an existing alignment. From these points, we'll be able to draw a line perpendicular to the alignment at a specific distance.

Starting Point

Run the *Pointalong* macro by hitting your **F12** key. You will be prompted to "Identify Point to Construct Distance From." (Figure 9-1)

Figure 9-1: StartPoint Along Status Prompts

The Macro is expecting a data point on your "alignment." Note that you can construct distances along many different kinds of elements: arcs, lines, line strings and complex chains and shapes are all legitimate elements to construct a distance along. This will let you construct distances along baselines, ROW lines, property lines, etc.

You are quite possibly going to be entering this start point based on an intersection of another line with your alignment. For instance, you may want to construct a Plus and Offset starting at the intersection of a tick mark with a baseline.

Entering the Distance and Direction

Once you've entered a data point telling the macro the start point, it will prompt you to "Enter Distance Along Element." (Figure 9-2)

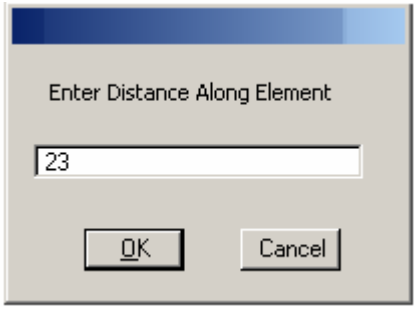


Figure 9-2: Input Distance

If you were trying to construct Station 1+35.240 from a tick mark at Station 1+20.000, the distance to construct would be 15.240. Enter in your desired value and press the **OK** button.

Choosing the Direction

This next step is very important. The macro isn't smart enough to know whether or not you want to construct a point to the left or to the right of the point that you just chose. Look down in your *Status Bar* to see that the macro is now prompting you to "Identify Direction for Construction." (Figure 9-3)

Figure 9-3: Status Bar Message

What it is asking for is a data point either to the left or to the right, or, in the case of a vertical line, above or below the first point you entered. Put your cursor on the baseline near the first point, but clearly to one side or the other (Figure 9-4) and enter in a data point (left button). There is no need to snap to enter this point.

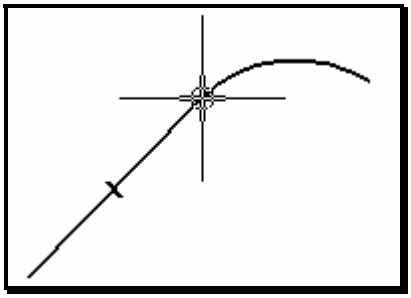


Figure 9-4: Identify Direction for Construction

When you enter a data point, MicroStation will start drawing a line at the specified offset and direction from the first point you entered (Figure 9-5).

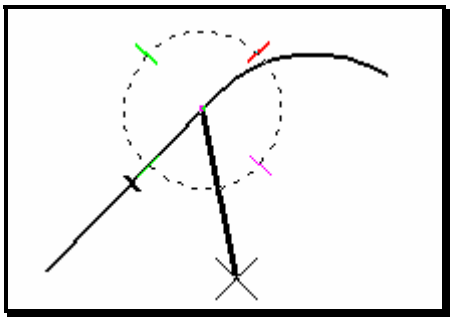


Figure 9-5: Point Constructed

It will also put the **Accudraw** compass on the line, rotated to make it easy for you to construct a line perpendicular to your baseline.

Choosing the Offset Distance

Now that we are drawing a line, we can choose to go either to the right or to the left of the baseline. Just put your cursor graphically near where you want the line to go. Keep your cursor near the axes of **Accudraw** and it will ensure that you are drawing perpendicular to the baseline.

Enter your Offset into the **Distance** field of your **Accudraw** window (Figure 9-6).

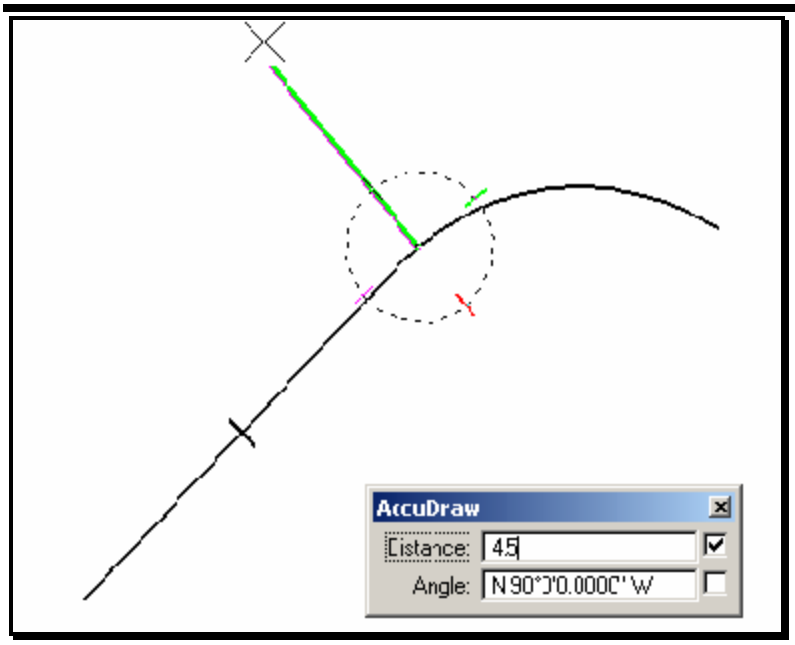


Figure 9-6: Constructing a Distance off the Baseline

Notice that the angle is 90°. Enter a *Data Point* to complete the command. *Reset* to stop drawing lines and press **F12** to start again!

Troubleshooting

There is a **Warning Dialog** (Figure 9-7) that you will get from time to time when you construct distances using this macro.

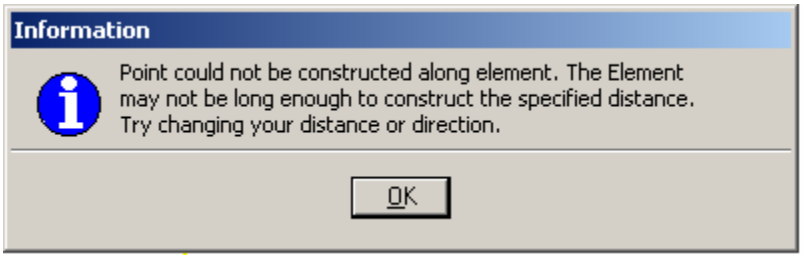


Figure 9-7: Pointalong Warning Dialog

It lets you know that the point you are trying to construct cannot be constructed because your Element is too short. This could happen for a couple of reasons.

1) You may have just chosen the wrong direction to construct from. Your baseline may run 16 kilometers to the right and only 16 centimeters to the left of your offset point. You can't construct a point 10 meters to the left of that first point.

2) You may have picked the wrong element to construct the distance along. Choose the point again and make sure that you *Accept* only the element you want to construct along.

3) You may have used the *Drop Element* tool to drop *Complex Status* of the baseline. This would have broken up the lines and arcs that are joined together in a "complex chain" of a baseline, leaving only individual lines and arcs. The resulting elements are much shorter than a typical baseline.

You can put dropped baselines back together using the *Create Complex Chain* tool. Set your method in the *Tool Settings Window* to **Automatic.**

✓ *Refer to 2-12 for using the Complex Chain Tool*

4) You may be confusing Metric and English units. Make sure you're not trying to go 75 feet along a 40-meter line. MicroStation reads that "75" distance as 75 meters if you're working in a metric drawing.

PROCEDURES

CREATING ROW PLAN SHEETS

Step One: Open RWPLAN-clips.dgn

Select your project from the list of projects in the **Project** pulldown at the bottom of the *MicroStation Manager*.

Select **RWPLAN-clips.dgn** from the list of files on the left and press **OK**. If the **RWPLAN-clip.dgn** does not exist the file will have to be created. Open the **RWplan.dgn**.

Select: > **File > Make Sheetz >** click on **no prefix** (Figure 9-8) and click **OK.**

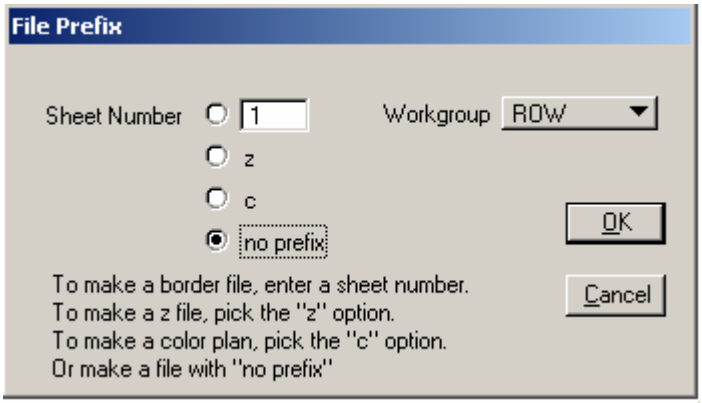


Figure 9-8: File Prefix Dialog

Choose **RWplan-Clips** (Figure 9-9) and click **OK** in the **Create File Of Type… Dialog**

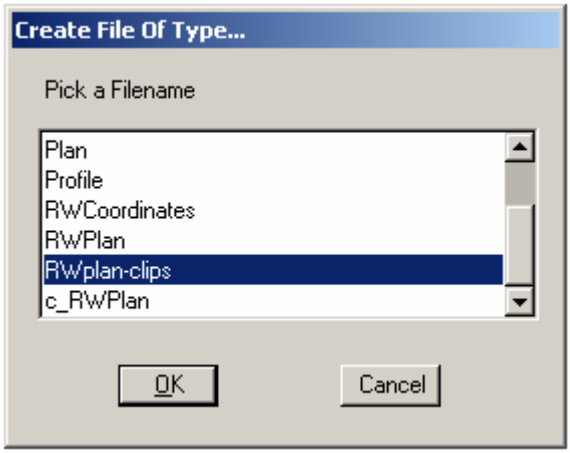


Figure 9-9: Create File Of Type Dialog

Click **OK** in the Make File Dialog (Figure 9-10).

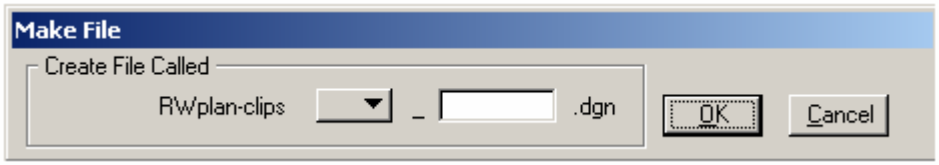
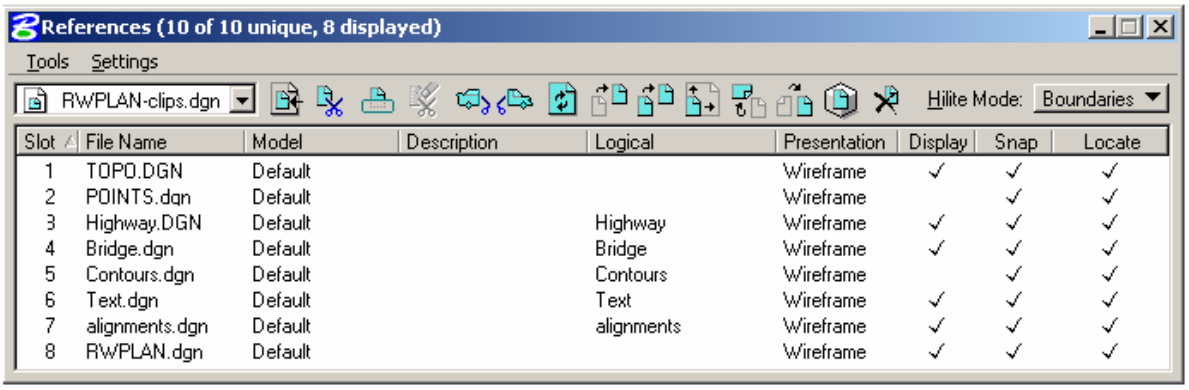


Figure 9-10: Make File Dialog

Click **Cancel** in the **File Prefix Dialog** to exit the **Make Sheetz** program.

In the **RWplan-clips.dgn** look in the **Reference Dialog** (Figure 9-11) to confirm the attached Reference Files.

Select: **Files > Reference(DOT) > Dialog**



Slot	File Name	Model	Description	Logical	Presentation	Display	Snap	Locate
1	TOPO.DGN	Default			Wireframe	✓	✓	✓
2	POINTS.dgn	Default			Wireframe		✓	✓
3	Highway.DGN	Default		Highway	Wireframe	✓	✓	✓
4	Bridge.dgn	Default		Bridge	Wireframe	✓	✓	✓
5	Contours.dgn	Default		Contours	Wireframe		✓	✓
6	Text.dgn	Default		Text	Wireframe	✓	✓	✓
7	alignments.dgn	Default		alignments	Wireframe	✓	✓	✓
8	RWPLAN.dgn	Default			Wireframe	✓	✓	✓

Figure 9-11: Reference File Dialog

- This dialog already shows that you have topo, text, bridge, highway, etc. files attached. If these files are not attached or other files are needed, refer to page 2-66 for Reference Attach Methods.

Step Two: Cut Sheets

Introduction

At this stage we are going to be placing rectangles along the alignment that will correspond to our sheets. We will be using the *Settings Manager* to accomplish this. The *Settings Manager* is docked at the bottom or top of your screen. If the *Settings Manager* is not displayed, it can be launched from the menus by **Settings >DOTSetMgrs > Right-of-Way**. Based on the file name, the correct *Settings Manager* should be automatically loaded.

Part One: Set Category Scale

Right Click anywhere on the *Settings Manager* and select **Category>Scale.** Select the intended plot scale for the plan sheets (i.e. 1 in. = 25 ft. or 1 in. = 50 ft. (1:250 or 1:500 for metric projects)).

- You should be the same scale that other programs are using for the project. When Survey Editors create the topo and text for the projects, this governs the scale.

Part Two: Place Clip Boundaries

From the *Settings Manager* select **Borders >Clip Boundary**. This selects our sheet boundary cell and activates a cell placement command that will make it easy to place a bunch of these rectangles along the alignment.

Notice the box on the end of your cursor. When you send a Datapoint to MicroStation, the box will be placed at that location. (You might want to set your snap mode to *Nearest* and snap to the centerline of road.) The box you just placed will immediately begin to rotate by the origin point (the point you just entered.) Move your mouse around and notice how

it spins. When it is aligned with the roadway, enter another Datapoint (again, you might want to *Nearest* snap to the centerline) and it will immediately prompt you to place the next boundary.

Don't worry if they're not in exactly the right place -- you can go back and clean up any mess later by using the move and rotate tools. It is important, however, that you place these boundaries in the order that you want your sheets to be numbered. We have a routine that automatically creates plot drawing files for us, and it will number them in the same order that you place these clip boundaries.

Step Three: Make new Plan Files

From the *Settings Manager* select **Tools > Plan File Maker**. This macro is doing a number of things. First off, it is creating saved views in RWPlan-clip.dgn that are aligned with the clip boundaries we just placed.

Now the macro will ask you what you want to name the file. It is automatically going to comply with a couple of naming conventions: files that will be plotted are all named with a number, then an underscore ("_"), then a sheet type (i.e. "RWPLAN"), then a counter (a 1, 2, 3, etc. that will differentiate between plan1, plan2, etc.) and finally the extension (".dgn."). The macro will prompt you to enter in the sheet type and will do the rest for you. Click **OK.**.

The macro will create the first file. It's going to attach rwplan.dgn to this new file, and it needs to attach by *Saved View*. What this means to you is that the **Attach Reference File** dialog is going to pop up and demand some input. All you need to do is double-check the name of the current file (it is listed in the upper left hand corner of your MicroStation window.) The first three characters of the filename should be a number (i.e. 001). This number is the name of the saved view that you want to attach. Select the saved view of that number from the *Orientation* portion of the **Attach Reference File** dialog. Ignore the *Nested Attachment* portion of the dialog. The file will be *Live Nested* behind the sceens. Click **OK**. The process will repeat for every boundary element you placed.

When you have finished attaching the last of the saved views you've made, it will drop you back into rwplan-clips.dgn. Open up the files you've just created and see how they look!

Troubleshooting

This macro has very specific expectations, and anything different about your input has the potential of giving you bad output.

It can only sheet up files in the order that the clip boundaries were placed in the file. If you need to add sheets at the beginning of the project, it might be easier to delete all your clip boundary cells that you placed and start again from scratch.

CONSTRUCT A METES AND BOUNDS DESCRIPTION

You will use this routine to construct county layouts and surveys. When you need to construct a Metes and Bounds, there are only a couple of things you're going to need to bear in mind.

Tools

You're going to be using *Smartline* and *Accudraw*. Make sure that you are in **Bearing** mode by hitting your **F9** function key.

Setup

First off, make sure you're in a *Top View*.

Choose **Rotate View** icon from the tools at the bottom of your View 1 - Top Window (Figure 9-12).

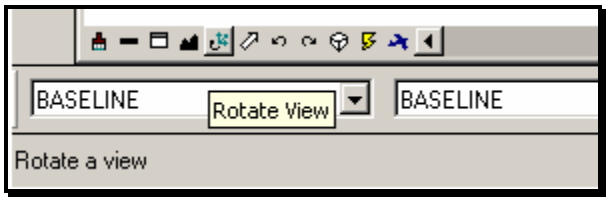


Figure 9-12: Rotate View Dialog

Look at your **Tool Settings Dialog** and make sure you have *Top* selected as your rotation **Method** (Figure 9-13).

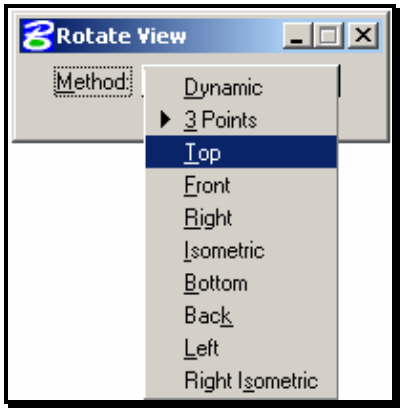


Figure 9-13: View Rotation Top Dialog

Enter a *Data Point* to begin your line, then type your bearing and distance into the **Accudraw Dialog**. Make sure you are in **Distance/Angle** mode. Hit your **Spacebar** if you aren't (Figure 9-14).

Figure 9-14: Toggle Accudraw Mode Dialog

Placing Lines

As you go, your **Accudraw Compass** is going to rotate to align with line that is being placed.

- You have to make sure that it is always rotated back to horizontal between every segment: type **V** with active **Accudraw** to rotate the **Compass** to the view (Figure 9-15).

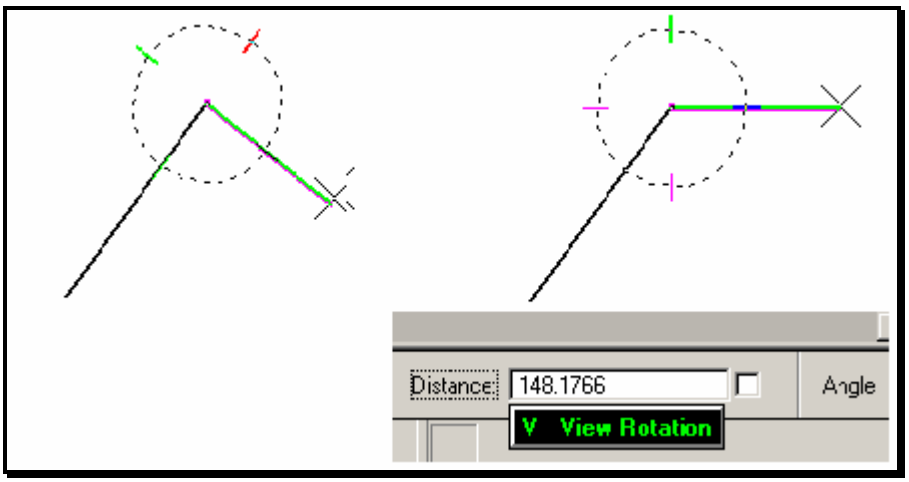


Figure 9-15: Rotate Accudraw to the View

For More Information

✓ *Check page 9-15 for more information on working with Baselines.*

Offset Using Copy Parallel

Once your line is constructed, you're going to want to offset the line by some distance. Use the **Move Parallel** tool from the **Manipulate** toolbox (Figure 9-16).

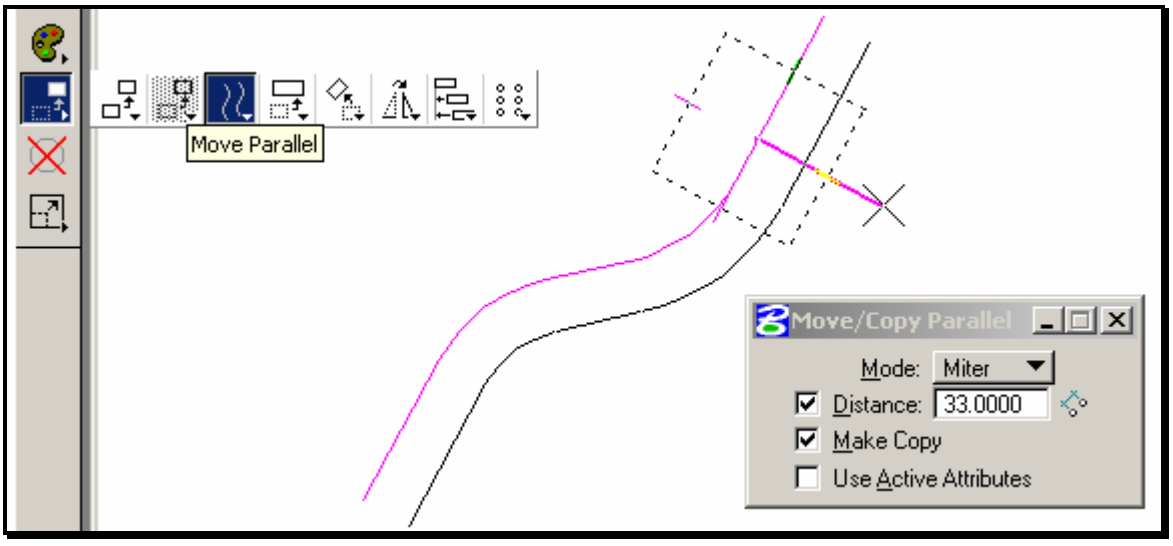


Figure 9-16: Move/Copy Parallel Dialog

In your **Tool Settings Window**, make sure that **Distance** and **Make Copy** are turned on. Type the offset distance into the **Distance** field and identify the element you want to copy

by *Data Pointing* on it. Move your mouse and watch the line pop back and forth to either side of your original line. Once it is displaying on the proper side, *Data Point* again to accept the final location. *Reset* to complete.

Fitting the Layout

Once the layout has been constructed, you're going to need to rotate and move it into place over the survey information. There are only a couple steps to this process.

First, use the *Element Selection* tool or *PowerSelector* to pick all the elements in your layout (Figure 9-17).

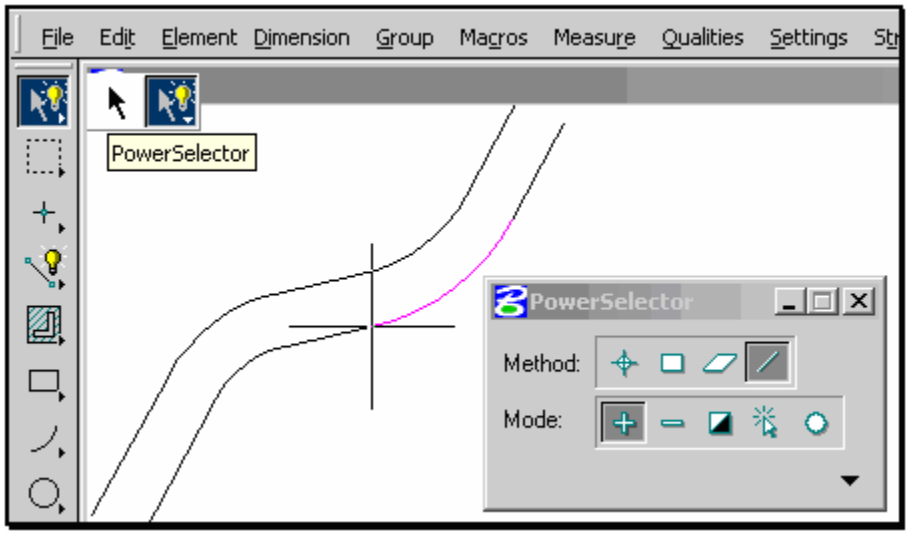


Figure 9-17: Pick the Elements in your Layout

Snap (but do not *Accept*) to your layout at the point you want to pick it up from.

Second, choose **Edit > Cut** (**Ctrl+X**) from your **Main Menu**.

Now, choose **Edit > Paste** (**Ctrl+V**) from your **Main Menu**. You should see your layout hovering over your drawing, hanging off your cursor from the point you gave it in step one (Figure 9-18).

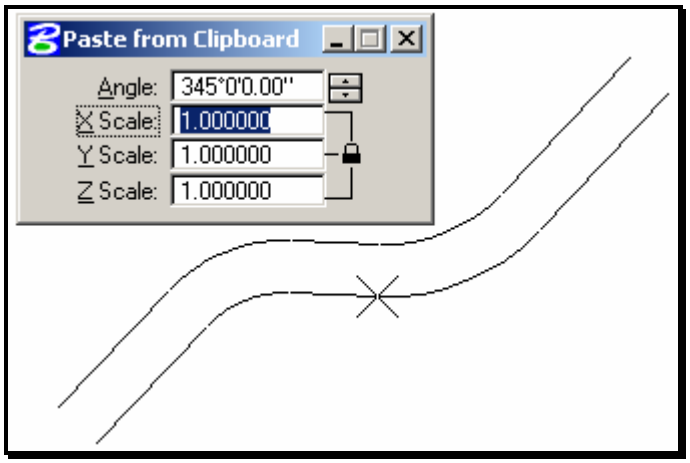


Figure 9-18: Paste your Layout Down

Look at your **Tool Settings Window** and be sure that your **Scales** are all set to 1 (otherwise, your layout will be made bigger or smaller.) Change the **Angle** field and move your layout around your drawing until you get a good fit. **Data Point** to place the layout in your drawing.

Fine Tuning

If you want to make changes to individual components of your layout after you've got it into place, use the **Modify** command from the **Manipulate** toolbox (Figure 9-19).

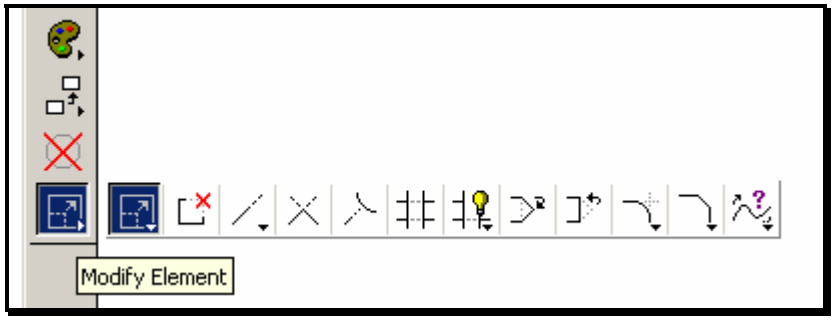


Figure 9-19: The Modify Command

With this command you can flatten or sharpen angles and shorten or lengthen lines. It basically will allow you to move any vertex to any other point. *Accudraw* sometimes interferes with these kinds of "eyeball" commands -- press your **F7** key until you see your **Accudraw Window** disappear. When you're done, press **F7** and it will come back again.

It's going to be tough to use *Modify* to make your second line be parallel to a *Modified* line. Use *Delete* to get rid of your second line entirely, and then use *Copy Parallel* to create another parallel copy of your *Modified* line.

BASELINE OVERVIEW

As with most things in MicroStation, there is more than one possible approach to constructing a baseline. What we are presenting here is the method that is going to minimize the amount of hand calculating required.

Baseline Geometry:

First we're going to construct the baseline using *Smartline* and *Accudraw*. We're only going to need a few pieces of information to complete a Baseline. For starters, we're going to need a Bearing and Distance of a tangent. After that, all we need is the Radius and Delta Angle for each curve and a distance for further tangents.

Checking and Cleaning Up Geometry:

After we have constructed a Baseline, we're going to drop it into its components to make sure we've drawn it correctly. If we've made any mistakes, we'll correct them with the *Modify* and *Rotate* tools. Then we'll group the Baseline back together as a *Complex Chain*.

Stationing and Annotating:

Next we'll place PC and PT lines. We'll label them from the *Settings Manager*.

✓ *Check page 2-20 for an overview of the Settings Manager.*

From those we'll find a beginning station and we'll put station marks along the length of the baseline. Then we'll edit the text of our Station Marks and place Curve Data.

BASELINE TOOLS

There are a number of tools that we're going to be using to construct our Baseline. Some of them have some very specific capabilities that we should review and clarify before you get started working with them.

Smartline

We're going to be relying on *Smartline* to create our baselines. *Smartline* is capable of creating a series of lines and arcs (Figure 9-20). We are going to be constructing lines based on *Distance* and *Bearing* and constructing arcs based on *Radius* and *Delta*. With a little help from *Accudraw*, it's going to be simple to build "on the fly" lines that are tangent to arcs as well as arcs that are tangent to other arcs.

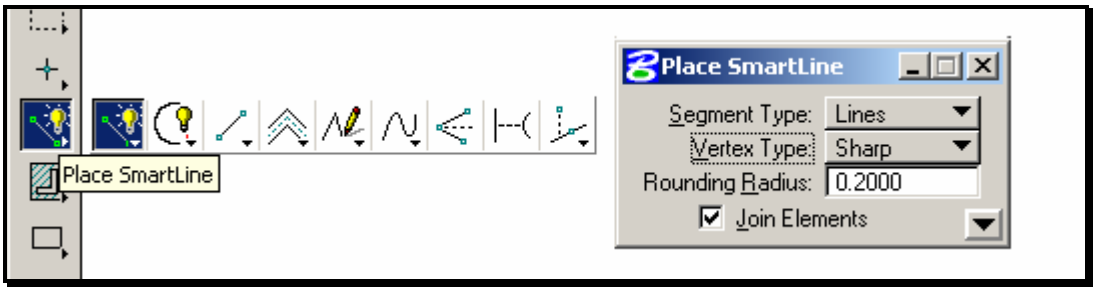


Figure 9-20: Smartline Segment Type Options

As we work we are going to be toggling *Smartline's Segment Type* back and forth from **Lines** to **Arcs**. We are not going to be making any changes to *Smartline's* **Vertex Type**. We are going to make sure it's set to **Sharp** and leave it at that.

Something that isn't going to be obvious at first about drawing with *Smartline* is that you should try to do all of your construction without hitting your *Reset* key (right mouse button.) With **Join Elements** selected in your *Smartline Tool Settings Window*, constructing your entire baseline without hitting *Reset* means that the resulting series of lines and arcs is going to be joined together as one element (a *Complex Chain*). Another benefit of constructing the *Smartline* as one element is that *Accudraw* is going to be more helpful. It's going to do this by keeping constant tabs on our latest distance and direction of construction.

A Word About Accudraw

Accudraw is a critical part of this process. There are a couple of things to keep in mind when you're using *Accudraw*.

First off, when you type angles into *Accudraw's* **Angle** field, you have to make sure you're typing in the right **Angle Mode**. Since we're going to be entering angles in both **Bearing** (N 23° W) and **Conventional** (113°) we need to be able to toggle back and forth between these two **Angle Modes** quickly.

We've set up *Function Keys* to accomplish this. **F8** will set the Angle Mode to *Conventional*; **F9** will set the Angle Mode to *Bearing*. When you are typing in Angles in *Bearing* mode, make sure to start your angle with either an **N** or an "S" and end your angle with either an "E" or a "W." In both *Bearing* and *Conventional* mode, you need to separate Degrees, Minutes, and Seconds with an appropriate symbol. MicroStation uses the ^

character to represent degrees (**Shift+6**). MicroStation uses the ‘ character for minutes and the “ character for seconds.

- Make sure that when you type a distance or an angle into *Accudraw* that you do not use the **Enter** key to “submit” your values to *Accudraw*. **Enter** has a very specific function to *Accudraw*. It is the *Smartlock* function. What this does is to lock the **Angle** of whatever you’re constructing to be either horizontal or vertical (relative to the **Accudraw Compass**.) We will be using the **Enter** key for **Smartlock**, but not for entering numbers in the window.

Also, keep your eye on your **Accudraw Window** when you’re entering in distances and angles to keep from typing angles into the distance field and vice versa. It takes a good long time to type an angle in bearing format right down to the nearest tenth of a second. It’s a shame to have to type it all over again because you entered it into the distance field instead of the angle field. The easiest way to get into the distance field from the angle field is by using your **Tab** key (just to the left of the letter Q).

Accudraw Shortcuts

Accudraw Shortcuts are single (or occasionally double) key strokes that you type while **Accudraw** is active. A common example of a shortcut is the **Spacebar**. When *Accudraw* is active and you hit the **Spacebar**, *Accudraw* shifts back and forth between **Distance/Angle** and **XYZ** mode.

Another shortcut that we’re going to get a lot of mileage out of is the **tilde** key (~). This is the key that’s just to the left of the number 1 at the top of your keyboard. This shortcut is called *Bump Tool Setting*, and we’re going to use it when we swap back and forth between drawing arcs and lines as we’re using the *Smartline* tool. It’s worth noting that you don’t have to hold down the **Shift** key to get this shortcut to work -- even though the “~” character is usually typed by holding down the **Shift** key.

Conclusions

These tools are going to be able to do just exactly what we need them to do to help us minimize the amount of hand calculations required to lay out a Baseline. However: they’re finicky. You’re going to have to keep a constant eye out on your **Accudraw** window and your **Tool Settings Window** to make sure that your options are set correctly as you go.

BASELINE GEOMETRY

Step One: Bearing and Distance

From the *Settings Manager* select **Baseline > Baseline** (Figure 9-21).

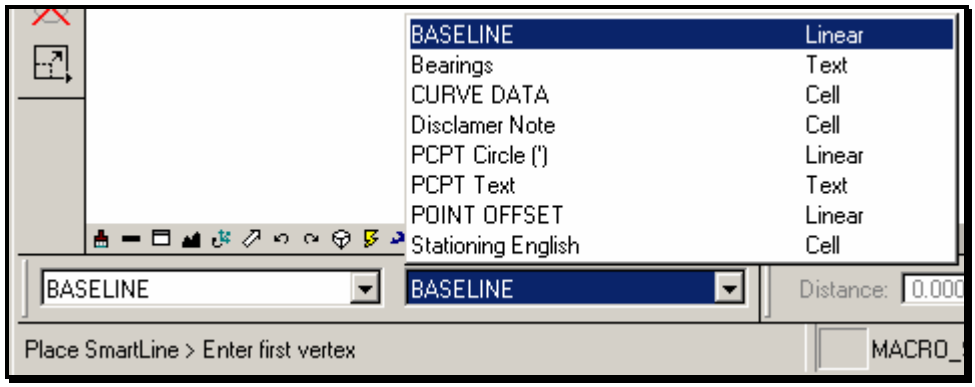


Figure 9-21: ROW Settings Manager

This will put you in the correct level, color, style and weight for drawing Baselines, as well as activating the *Place Smartline* command.

It's a good idea to start every baseline with a Bearing and Distance if at all possible. Start by entering a Data Point to begin your line. Take a look at your **Accudraw Window** and make sure that you are in *Bearing* mode (look for an **N** or an **S** in the angle field.) If you're not, press **F9**. This will run a MACRO that sets your active **Angle Mode** to **Bearing**. Then enter your **Bearing** and **Distance** into your **Accudraw Window**.

Note that you can still draw the line either to the left or the right of the origin point, as illustrated in Figure 9-22 and Figure 9-23. Make sure that your line on the screen visually agrees with the baseline you intend to draw by moving your cursor either to the left, right, up, or down to get the direction correct.

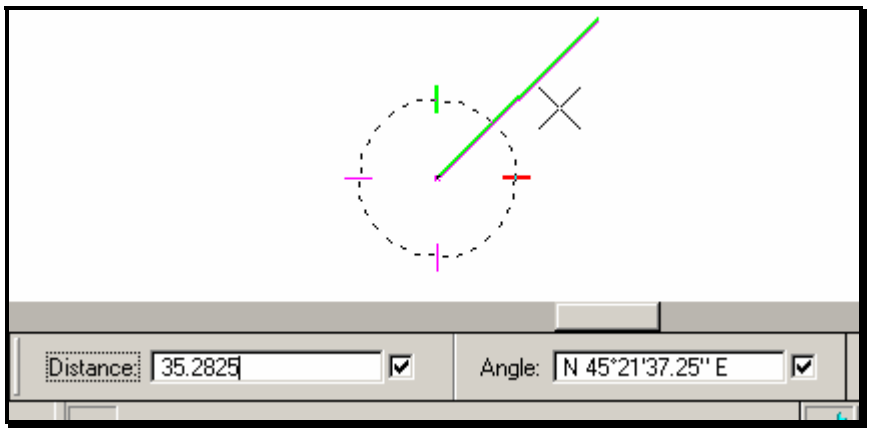


Figure 9-22: Drawing to the Right at a Fixed Angle

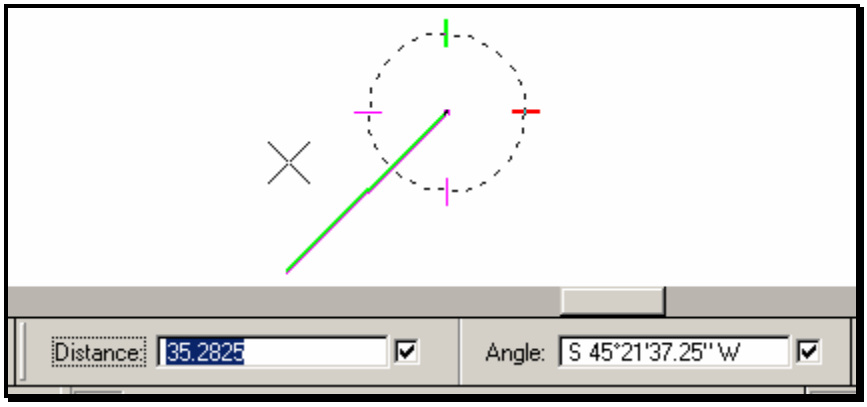


Figure 9-23: Drawing to the Left at the Same Angle

ⓘ ***Don't enter a Data Point until you're satisfied that you're drawing in the right direction.***

Step Two: Troubleshoot and Prepare to Draw a Curve

You have now successfully entered the first segment of your Baseline. Do not hit your *Reset* button (right mouse button.) MicroStation should now be in the middle of drawing a *Smartline* (Figure 9-24) Your **Status Bar** (bottom of your screen) should be prompting you to "Enter next vertex or Reset to complete."

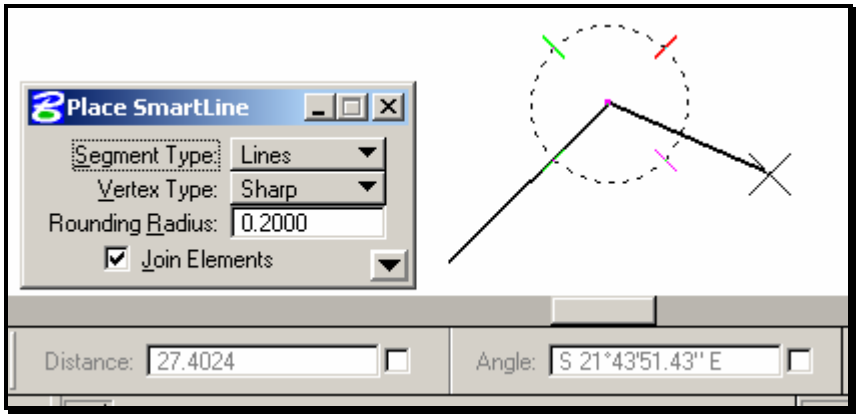


Figure 9-24: First Line Complete

Even if you have screwed up this first portion, do not hit your *Reset* button -- go to your *Main Menu* and select **Edit > Undo Last Data Point**. This is important to keep in mind now and for the rest of this creation process: if you make a mistake, **UNDO**. Do not *Reset*. You can also **Undo** by typing **Ctrl+Z**.

If you do (accidentally) hit your *Reset* at this stage, it's not the end of the world. All you have to do is start drawing again. Snap to the end point of the baseline you just constructed and *Accept*. This will put your **Accudraw Compass** at the correct point but it will probably not be rotated.

Tentative Point. Instead, type "RQ." This will activate **Accudraw's** *Rotate Quick Shortcut* and spin the **Compass** to the proper rotation.

♫ Use the **Tilde** key (~) to toggle *Smartline* from **Segment Type Lines** to **Segment Type Arcs** (Figure 9-25).

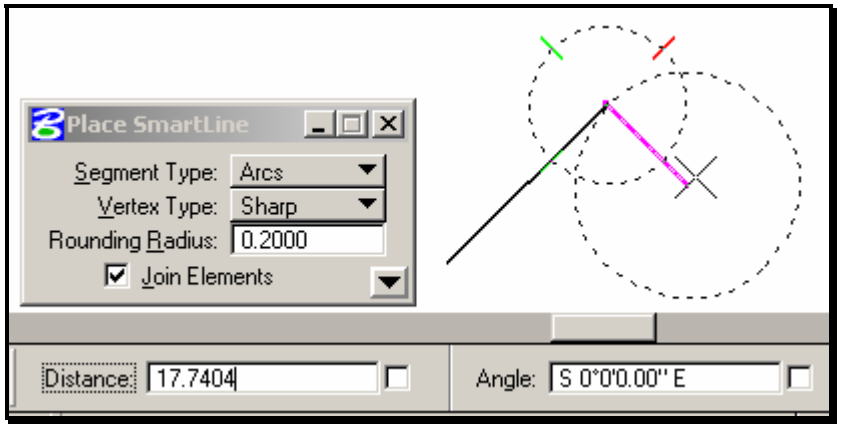


Figure 9-25: Swap to Smartline Arcs

Now type **F8** to change your angle mode back to *Conventional* from *Bearing*. This is going to help us enter in curve deltas (as arc sweep angles.)

Step Three: Draw a Curve

Move your mouse around a bit to notice a couple of specific features here. First off, you're going to see a dotted circle moving around the screen. Notice that your cursor is at the center of this circle.

Notice also that the **Accudraw Compass** is at the edge of this circle at the point where the circle intersects the line you just drew. Move your mouse around until the dotted circle looks like it's perpendicular to the line you just drew. Notice that as you get close to this point, **Accudraw** is going to tend to "snap" you in along one of its axes. This is going to help us lock in our curve to be tangent to our baseline.

Moving your mouse around, line up the dotted circle so that it is curving in the right direction. Also make sure it is at least visually perpendicular to the baseline, then hit **Enter**. This is **Accudraw's Smartlock**, and it will nail down the location of the center of the curve. Now you're ready to enter in the Radius of the curve.

ⓘ ***Make sure that you are typing in Accudraw's* Distance *field (if there is a cursor blinking in the* Angle *field, hit your* Tab *key to put it in the* Distance *field.), then type the radius of the curve.***

What you are entering at this point is the center point of the curve. As you know, the center of the curve can be a long way away from the baseline. What this means to us in MicroStation is that the point you are about to enter may be way out of your *Window*. This is not a problem. Enter in a Data Point to accept the point you've just constrained, and let's see where we are.

What you're going to see is probably going to be something like the picture in Figure 9-26. As you move your mouse around you'll notice you're constructing an arc. You'll notice a couple of dotted lines that are radial to the arc, one of them at the tangent point to the baseline, one of them near your cursor.

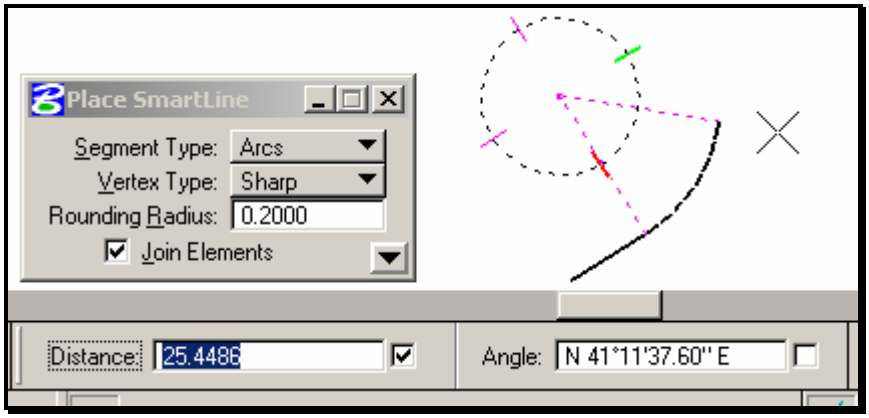


Figure 9-26: Sweep an Arc

What you need to do here is make sure that you are drawing this curve in the right direction. You may have to use the **Zoom Out** command to get the center of your arc in your view. Type **F3** and *Data Point* in your window.

Zoom Out. You may need to click a few times to **Zoom Out** a number of times. *Reset* (just once) and MicroStation will drop you out of your **Zoom** command and back into the **Place Smartline** command and it will show you a more complete picture of the curve you are constructing.

Once you can see the **Accudraw Compass** at the center of the arc, move your mouse around a bit. Notice that the arc sweeps around with the mouse. To change the direction of the arc, sweep your cursor around the **Compass** point until you see the arc begin to look a little bit more like you want it to. Now you're ready to enter in the Delta of the curve.

Make sure you are typing in **Accudraw's** *Angle* field. Again, if you are in the *Distance* field, just type *Tab* to get to the *Angle* field. Now type the Delta value for the curve into the field. Enter a **Data Point** when you are done.

Step Four: Troubleshoot and Prepare for Another Curve or Tangent

You have now successfully placed a Curve on to your Baseline.

- If you made a mistake in this portion of construction, remember NOT TO HIT YOUR **RESET** (Right mouse button.) All you need to do is **Undo** (**Ctrl+Z**) to gracefully step back in the command and pick up your construction from the last correct point. You can **Undo** more than once, if need be, but take it slow and be sure not to **Undo** too far.

If you did (Accidentally) hit your *Reset* key, you can start up again like you did in **Step 2** with one notable exception. You're going to snap to the end of your baseline and Accept to start placing your *Smartline* again. Then you need to get the **Accudraw Compass** rotated correctly again. Instead of snapping to the center of the last tangent, you're going to want to snap to the center of the last curve that you placed (use the *Center Snap* by typing **C** into *Accudraw*). Note that this center point is usually far away from the baseline. Once you've snapped, type **RQ** to rotate *Accudraw's* compass.

At this stage of the game you're totally set up to repeat **Step 3** and construct another curve. Your *Accudraw Compass* should be all set up and your *Angle Mode* should be

correct and ready for curve placement. Go back to the beginning of **Step 3** if you're going to lay in another curve.

If, however you are going to construct a tangent from this point, you need to toggle *Smartline* back to its **Segment Type Lines** mode by typing a **Tilde** (~) into **Accudraw**. Check that the change has been made in the **Tool Settings Window**.

It is not going to be necessary to enter in the *Bearing* for this next tangent. If we have constructed our curve correctly we can just let *Accudraw* get the *Bearing* right for us.

Move your mouse around until *Smartline* looks like it's going to draw a tangent in the right direction (Figure 9-27). Hit the **Enter** key to activate *Accudraw's* **Smartlock**.

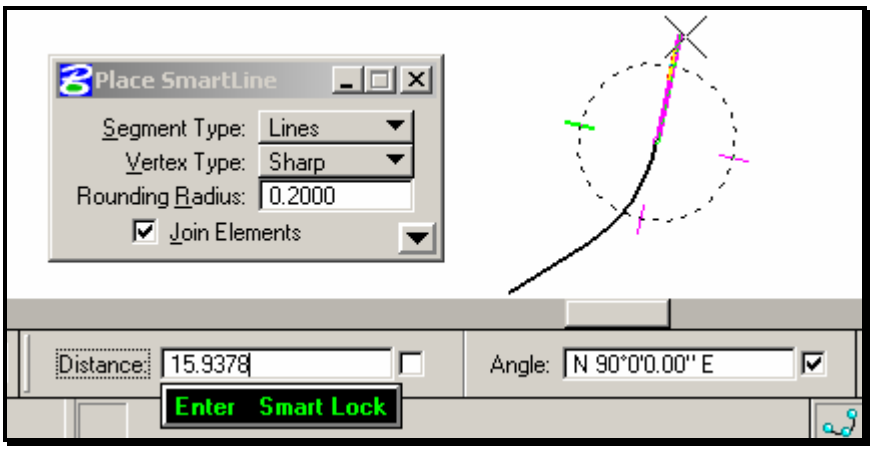


Figure 9-27: Construct Tangent Direction

Make sure you are in the **Distance** field by hitting your **Tab** key and type in the length of the Tangent

Note that this tangent distance is just the distance between the PT and the next PC or end of project. Enter a *Data Point* to accept this point.

Step Five: Troubleshoot and Prepare for Another Curve or Tangent

Again, make sure not to hit your *Reset* until you're done with your whole baseline. If you do hit your *Reset*, check out **Step 2** for a method of getting back on track.

From this point, you now have all the construction tools you need to create any sort of baseline. The next step will be to double-check the geometry you have laid out and make any necessary corrections. Then we'll go on to Stationing and Annotating

BASELINE CHECKING/CHANGING

Once you have your baseline constructed you're going to want to make sure you haven't made any mistakes. If you have, you're going to need to fix it up.

Drop Complex

It's going to seem strange since we went to all that trouble to make sure our alignment was a single element, but the first thing we're going to do when we check our baseline is to drop it up into separate elements. We're going to do this to make it easier to check the length of individual elements.

Pick the **Drop Element** tool from the **Main Tool Frame**. Check your **Tool Settings Window** and make sure that *Complex* is checked off (Figure 9-28). This ensures that *Complex Chains* will be dropped into their individual components.

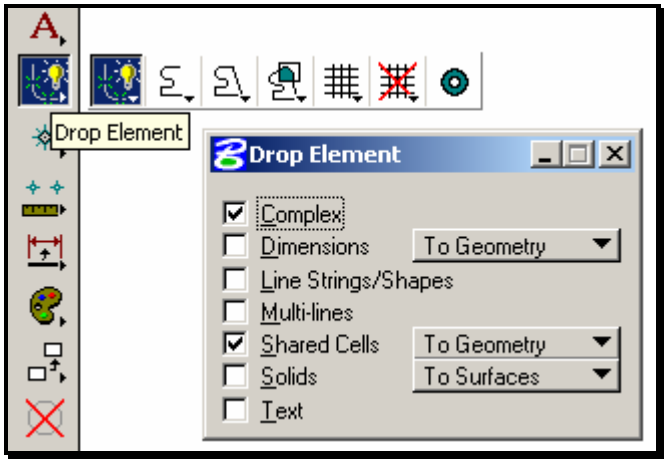


Figure 9-28: Drop Elements Complex

Check your *Status Bar* (at the bottom of your screen) for prompting about what to do next. It should tell you to "Identify element."

Data Point on the baseline. It will highlight, and your *Status Bar* will prompt you to "Accept/Reject (select next input)". *Data Point* to *Accept* and your baseline will be broken up into a series of lines and arcs. If there was an angle point on your baseline, you may have constructed a baseline that has two intersecting tangents. When you drop complex status of this baseline, this "elbow" is going to be preserved as a *Line String*. To drop that *Line String,* use *Drop Complex* again, making sure to have *Line Strings/Shapes* toggled on in your **Tool Settings Window**.

Measure Lengths

From the *Measure* toolbox, pick the *Measure Length* tool. This is a great tool for measuring the components of a baseline. It will tell us the length of tangents and curves, as well as the bearing of tangents. Make sure that you are reading angles in *Bearing* mode by pressing **F9**.

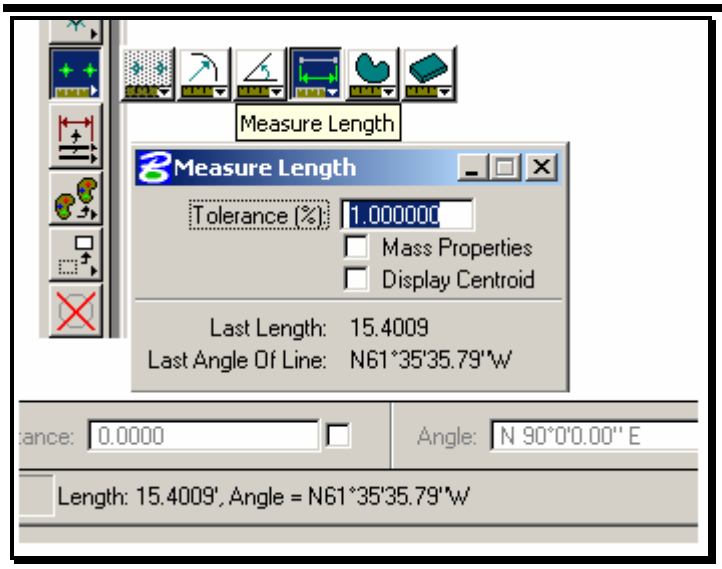


Figure 9-29: Measure Length

Your *Status Bar* will be prompting you to “Identify Element”. It is not going to be necessary to snap to the element to pick it here, just *Data Point* on the element you want to measure. It will highlight, and you’ll be prompted to "Accept/Initiate Measurement." *Data Point* to *Accept*, and MicroStation will display some information for you regarding this element. Look to the lower middle of your *Status Bar or the Measure Length Dialog* for the length of lines and arcs, as well as the bearing of lines (Figure 9-29).

Measure Radius of Curves

Once you have established the bearing of lines and the length of lines and arcs, you should double-check the radii of the curves of the baseline. From the **Measure** toolbox, choose **Measure Radius**. The *Status Bar* will prompt you to "Identify Element."

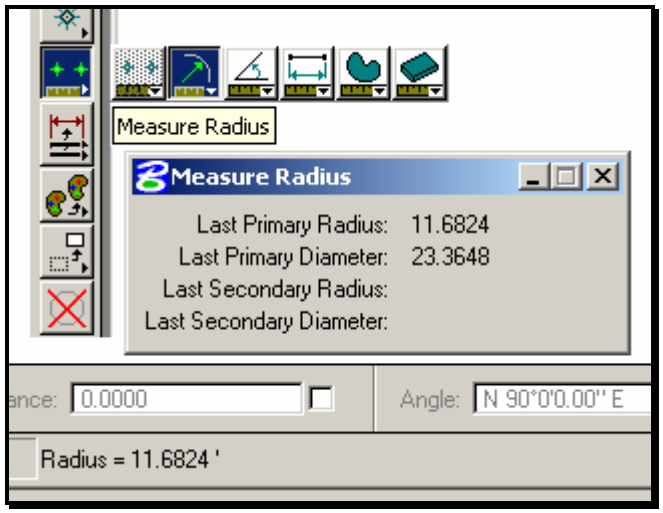


Figure 9-30: Measure Radius

Data Point on an arc and it will highlight. You'll be prompted to "Accept/Initiate Measurement." *Data Point* again and you will see the Radius being displayed in the lower middle of the *Status Bar or the Measure Radius Dialog* (Figure 9-30).

Fix the Problems

So you've found out that something isn't quite right with the baseline you've just constructed. There are a number of tools that we can use to fix it up.

Modify

The *Modify* tool is going to let us change the distance and bearing of lines, as well as the sweep angle (delta) and radii of curves. From the **Modify** toolbox on the **Main Tool Frame**, choose the **Modify** tool (Figure 9-31).

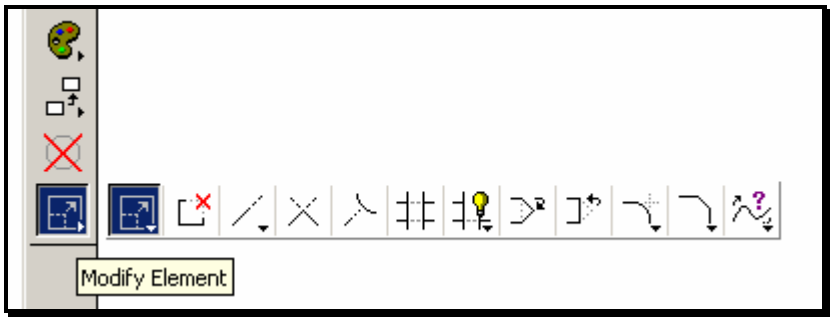


Figure 9-31: Modify Element

Rotate

Say you've made a change to the bearing of a tangent line. That is going to affect the curve that you previously constructed from that tangent. You need to use the *Rotate* tool to reorient that curve to align with your modified tangent.

From the **Manipulate** toolbox on the **Main Tool Frame**, choose the **Rotate** tool (Figure 9-32). From the **Tool Settings Window** make sure to set the **Method** to **3 Points**.

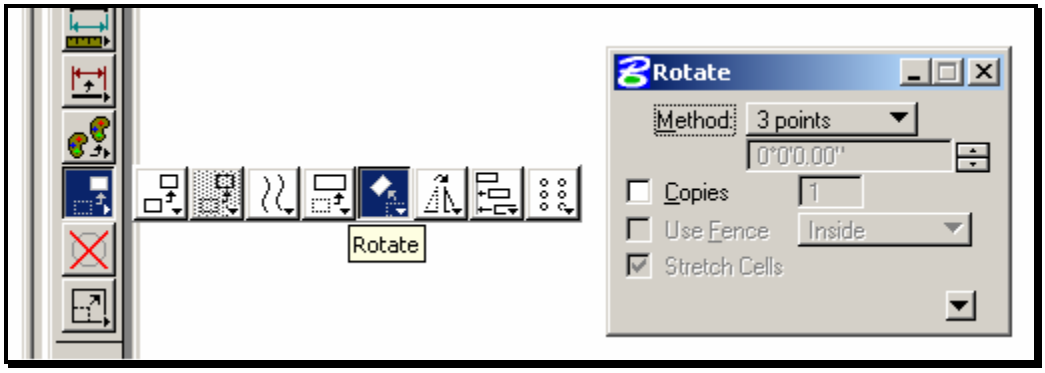


Figure 9-32: Rotate Element

It is also possible that you made a mistake on your initial bearing and need to reorient the rest of your baseline. You might have too many segments to want to fix them one at a time. You can use the *PowerSelector* to pick all of the elements that need to be reoriented (Figure 9-33). That makes it possible to rotate the entire baseline at once.

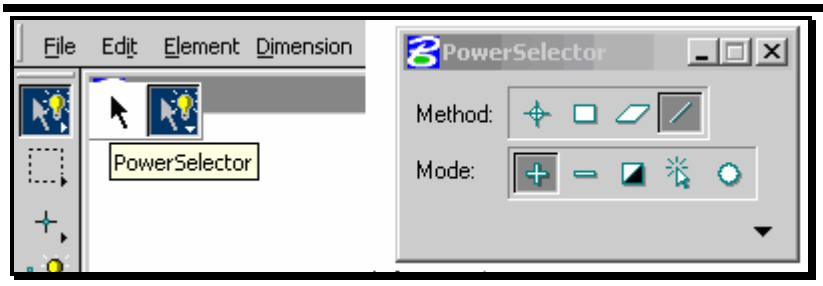


Figure 9-33: Power Selector

Punt

If it looks like it's going to be too complicated to modify and manipulate your baseline into shape, you can always wipe it out and start again. Practice is good.

Put It Back Together Again

Now that we've checked and rechecked and fixed all of the problems in our baseline, we're going to want to reassemble it into a *Complex Chain*. From the **Groups** toolbox, choose **Create Complex Chain**. In the **Tool Settings Window**, make sure to set the **Method** to **Automatic** instead of **Manual** (Figure 9-34). Your **Status Bar** is going to be prompting you to "Identify Element". Pick the first element in the baseline with a *Data Point*. The element will highlight. *Data Point* away to *Accept*.

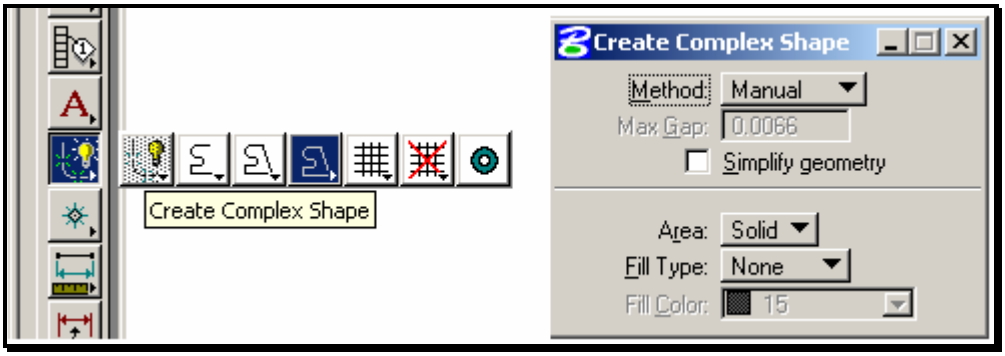


Figure 9-34: Create Complex Chain

Now MicroStation will look for another element to attach onto the end of this first element. Whatever element it can find at the end of that first element (within a certain distance: the "*Max Gap*") will be highlighted, and MicroStation will prompt you to "Accept Chain Element." *Data Point* to *Accept* each portion of the baseline as MicroStation finds it. If MicroStation cannot find an element, it will finish up the *Complex Chain*.

If for some reason MicroStation doesn't find elements that should be part of the baseline, the first thing you need to do is **Undo** the **Complex Chain** that you just created. If you don't do this, you're going to end up with lots of elements on top of each other by the time you're through recreating your baseline.

MicroStation may not have found elements to put on the end of the chain because they were too far away from the end of the element preceding them. This could be as simple as a missed snap or as complicated as a 3D issue. You should be able to resolve it by using the *Move* command (make sure to *PowerSelector* if you want to move the entire alignment

together) and carefully put the problem elements into place at the end of the baseline. If this doesn't work, try flattening the file (**Macros>Flatten)**. Then go back and recreate the *Complex Chain* from the first element again.

BASELINE STATIONING

There are going to be a couple of steps involved in Stationing. First we're going to label the PCs and the PTs. Then we'll use those points along with the *"Pointalong"* macro to find a beginning station. From there, we'll use the *Settings Manager* to place our stations.

Construct the PCs and PTs

Choose **BASELINE** from the *Settings Manager* to set the element attributes**.** The way to find the PCs and PTs is to snap to the ends of your curves. Place your cursor *near* the intersection of a tangent with a curve but ON the tangent and hit your middle button. You should see the tangent highlight and a crosshairs will appear at the end of the tangent (Figure 9-35). *Accept* this point with a *Data Point* to start the PC line.

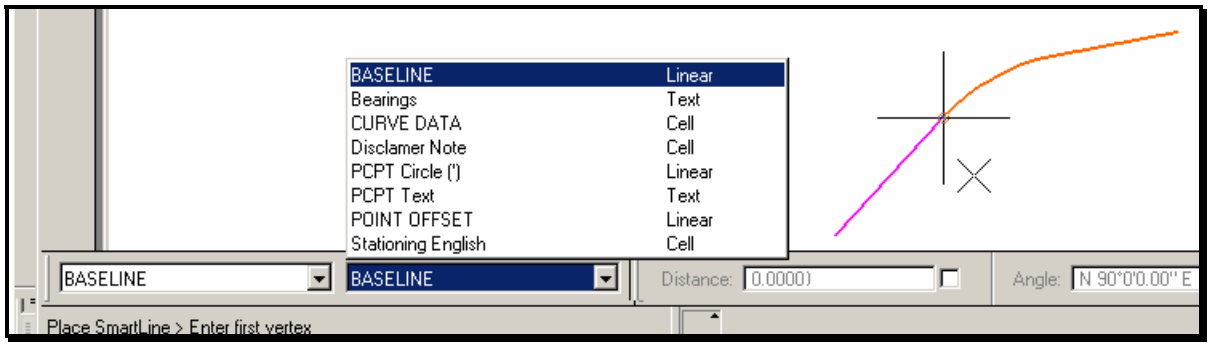


Figure 9-35: Snap to the End of a Curve

Choose **Center** as your *Snap Mode* and *Tentative snap* to the curve. Make sure **Accudraw** is in **Distance/Angle** mode (the *Accudraw Compass* will be a circle if it is). Type "150" (50 for metric) as your distance (making sure your cursor is in the *Accudraw Distance* field.) This will lock your line to be pointed at the center of the curve (perpendicular to the Baseline) and 150 feet (50m metric) long. Accept by entering a *Data Point*.

Repeat this process for all PCs and PTs along the Baseline.

Double Check Your Baseline Chain

Step Zero at this phase is to make sure that your Baseline is all one element (*Complex Chain*). From the **Primary Tools,** pick the **Element Information** tool. MicroStation will prompt you to “Identify Element.” Pick on your Baseline with a *Data Point. Data Point* again to *Accept*. A dialog box will appear that will tell you (at the top) what kind of an element your Baseline is. The top of the dialog should say “Element Information for Complex Chain [Type 12]”. If it does, close the dialog and continue. If it doesn't, make it into a *Complex Chain*.

Generate a Station Marker

Once the PC’s and PT’s lines are drawn, you're going to use the Station of a PC or PT to locate an even 100’ (20m metric) Station on the Baseline. Press the **F12** key to run the *Pointalong* macro.

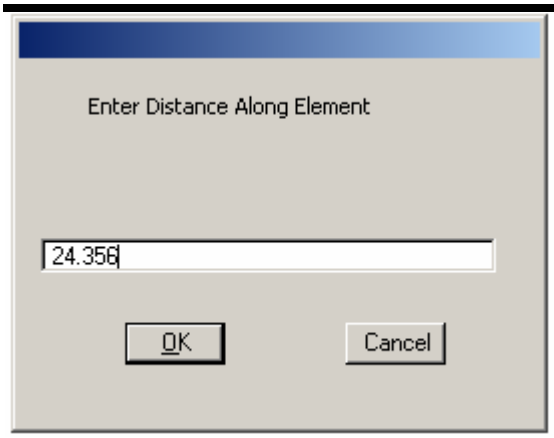


Figure 9-36: Point Along Distance

Data Point to *Accept* and MicroStation will prompt you to enter in a distance (Figure 9-36). Take the station of your PC or PT and calculate the distance to a nearby 100' (20m for metric) station (you do the math.) Enter this distance and push **OK.** MicroStation will prompt you to "Identify Direction for Construction." Enter a *Data Point* on the Baseline in the direction of the Station you want to place. Finish drawing the line at this point. This will serve as a *Station Marker Construction Line* for placing your Stationing in the next step.

Place Generic Stations

Now that we have a marker on an even Station, we can use the Stationing tools in the *Settings Manager* to begin to annotate. From the **Settings Manager**, choose **Baseline > Stationing Metric.**

MicroStation is going to prompt you to "Place Cell Along > Identify Element." We want to pick the Baseline, but we want to be certain to pick it at the point where our Station Marker Construction Line intersects the Baseline. We're going to do this by using the *Intersection* snap again. Make sure to snap to the Construction line first, then the Baseline. *Data Point* to *Accept* and it will show generic station markers at even intervals along your Baseline. At this point you will need to **Data Point** one more time to Accept this configuration.

Fill in the Station Information

What you have just placed is a series of tick marks along your Baseline. These tick marks are labeled by stations marked 0+00 (0+000 for metric). The next thing we have to do is change these stations to the proper values. These Underlined letters are a special kind of MicroStation text called *Enter-Data Fields.*

We are going to make changes to these Fields by using tools from the **Text** toolbox from the **Main Tool Frame** (Figure 9-37).

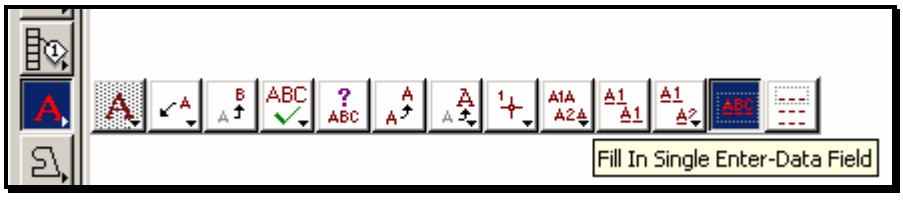


Figure 9-37: Fill in Single Enter Data Field

We're going to start by changing the value of the first Station on our Baseline. From the **Text** toolbox, choose the **Fill In Single Enter-Data Field** tool. MicroStation will prompt you to "Identify Element". Pick on the underlined characters of your first Station with a single *Data Point*. MicroStation will open the **Text Editor**. Type your Station into the **Text Editor** and hit **Enter** (Figure 9-38).

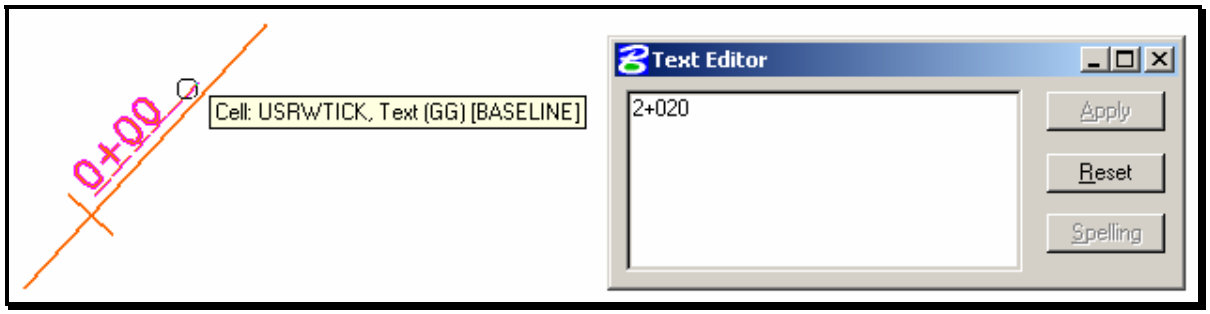


Figure 9-38: Pick an Enter Data Field (Metric Example)

MicroStation will put the text you typed into the **Text Editor** into the **Enter-Data Field** (Figure 9-39).

Figure 9-39: Data Point to Change the Field (Metric Example)

Once we have the first Station correct, it's going to be easy to fill in the rest of our Stations. We're going to use a tool that will copy our Data from that one field into each Station. For each Station we fill, MicroStation is going to add 100 to the value of the previous Station.

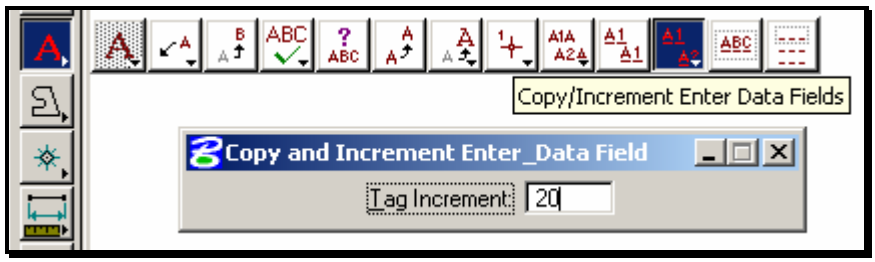


Figure 9-40: Copy/Increment Enter Data Fields

From the **Text** toolbox, pick the **Copy/Increment Enter-Data Fields** tool (Figure 9-40). On your **Tool Settings Window**, set your **Tag Increment** to 100 (20 for metric). MicroStation will prompt you to "Select enter data field to copy." *Data Point* on the field you just entered.

The Station value should appear in your Status bar. Now *Data Point* on the next Station. MicroStation will change the value of that Station to the next appropriate value.

Keep picking stations (in order) until you get station 2+100. MicroStation is not smart enough to put that hundred marker on the left side of the plus sign. Go back to the *Fill In Single Enter-Data Field* tool and change the station to 3+00. Then use the **Copy/Increment Enter-Data Fields** tool to continue stationing.

PTs and Curve Data

There are only a couple of tricks to labeling the PCs, PTs and Curve Data.

Text Placement Options

The first step here is to label the PCs and PTs. MicroStation has a couple of text placement features that are going to make this an easy process. When you place text, you have a number of options about how that text is going to get stuck into the drawing. By default, your text placement method is **By Origin**. This method hangs the text off the end of your cursor and stamps it into the drawing wherever you click.

The methods that we're going to be using to label the PCs and PTs are **Above Element** and **Below Element** (Figure 9-41). When you use these methods, you type in the text you'd like to place, and then *Data Point* on an element. MicroStation will then place in the text you've typed either *Above* or *Below* that element.

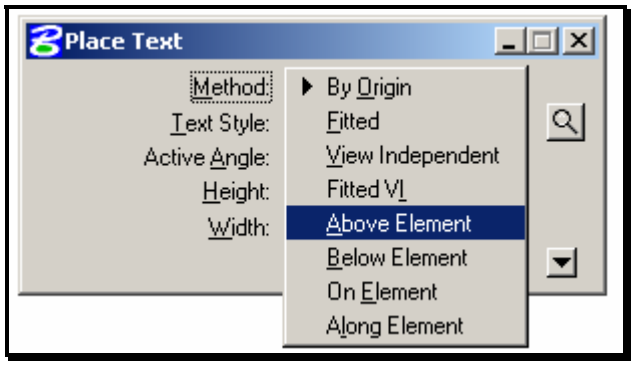


Figure 9-41: Text Placement Methods

We will also be setting the **Justification** value to either a **Right Top** or a **Left Top Justification**. If the PC/PT line is on the Right of the Baseline, we'll be using the **Right Top Justification**. If the PC/PT line is on the Left of the Baseline, we'll be using the **Left Top Justification**. To set the *Justification,* expand by click the arrow in the lower right corner of the *Place Text Dialog.*

Label the PCs and PTs

From the **Settings Manager** choose **Baseline > PCPT Text**. This will set your active text height, width, and font and will launch the *Place Text* command. Based on the desire to keep the PC and PT labels to the INSIDE of the curve, make a decision about whether your current PC or PT should be **Above** or **Below** the PC/PT line. Select **Above** or **Below** from the **Method** section of the **Place Text Tool Settings Window**. Select a **Justification** from the same **Tool Settings Window** (Figure 9-42).

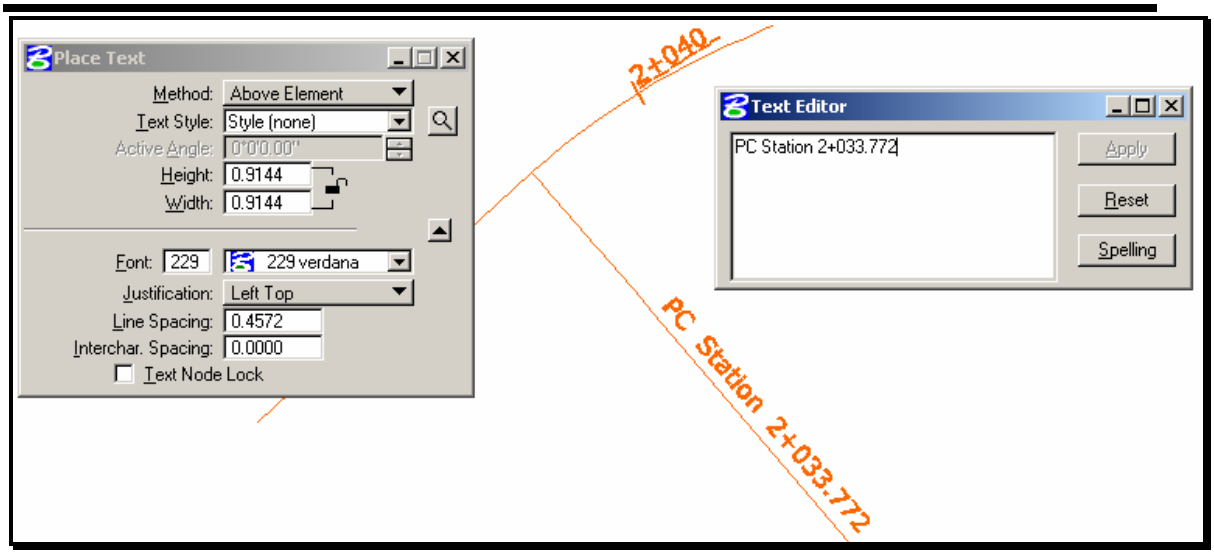


Figure 9-42: Labeling a PC (Metric Example)

Type your text into the **Text Editor** and place it on your PC/PT line by snapping (*Keypoint*) to the end of the line. **Data Point** to Accept and MicroStation will highlight the line (Figure 9-42). **Data Point** again and it will place the text.

Place PC/PT Circles

Next we need to place circles (of radius 2.5' (.75m metric) at the PC and PT point on the Baseline. From the **Settings Manager** choose **Baseline** > **PCPTCircle (m)** or **>PCPTCircle (')**. This will stick the appropriately sized circle on the end of your cursor. Stamp it into place by snapping to the ends of the PC/PT lines.

Place and Edit Curve Data

Once you have labeled the PC and PT lines with text and circles, it's time to place Curve Data on the Baseline. Our Curve Data is stored in a cell in our ROW cell library. We're going to place the cell onto our drawing as many times as necessary to label all of our curves. For each one, we're going to want to try to rotate the cell such that it's aligned with the radius of the curve at the center of the curve's length.

From the **Settings Manager**, choose **Baseline > Curve Data** (Figure 9-43). This will pick our Curve Data cell from our cell library and stick it on the end of your cursor.

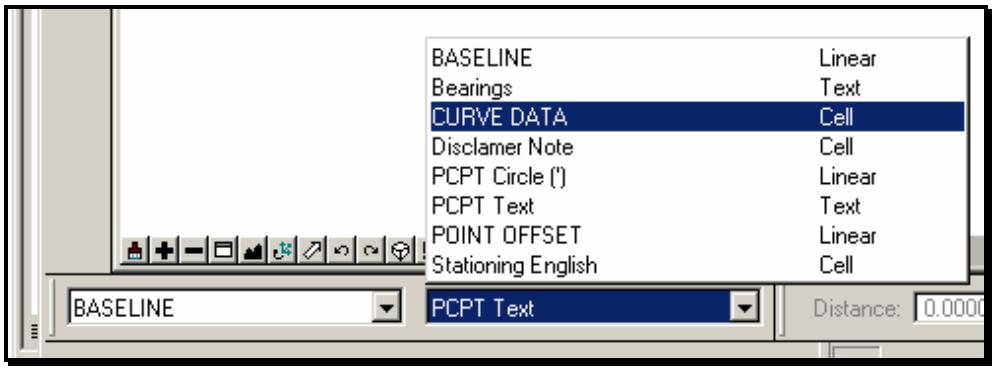


Figure 9-43: Choose Baseline>Curve Data

When the *Cell Tools Dialog* appears click on the **Place Cell and Rotate Icon** (Figure 9-44). By adjusting the number of degrees in the **Angle** field of the **Place Cell and Rotate Dialog** can be placed between the PC and PT of the curve with a *Data Point*.

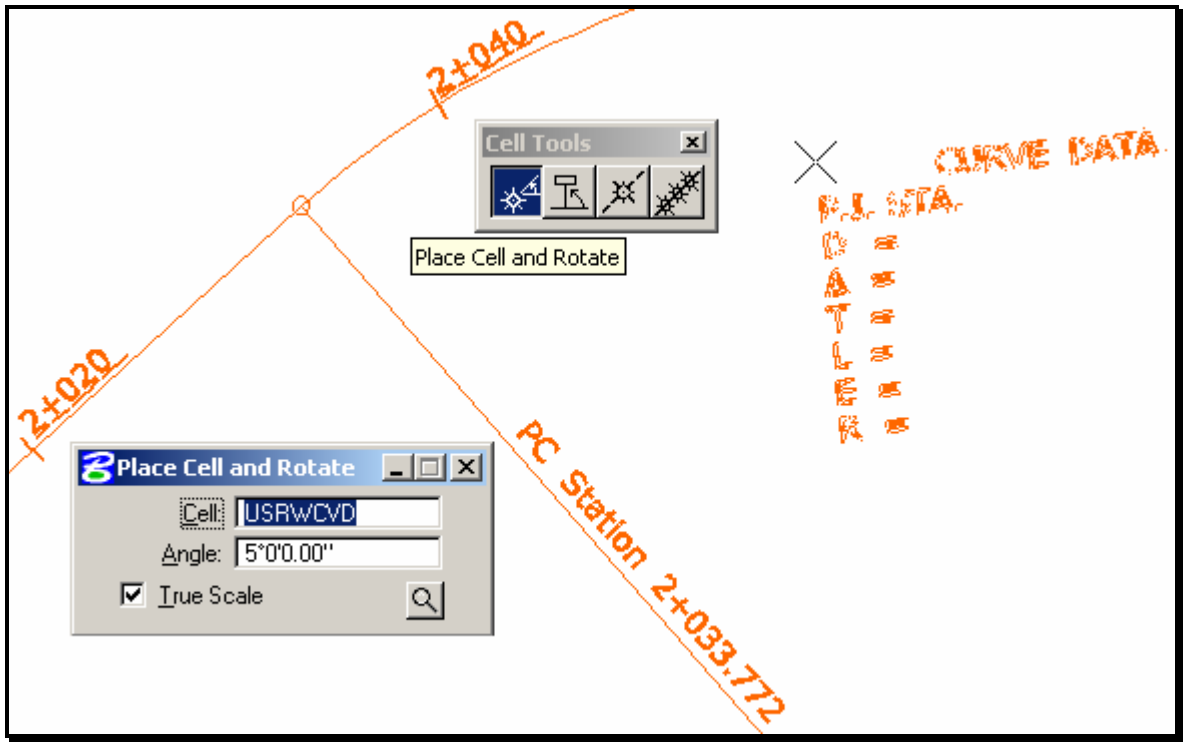


Figure 9-44: Placing Curve Data

Once your Curve Data is in the right place on your drawing, you are going to have to edit it to the correct values. Since you can't edit text that is in a cell, we're going to have to start by *Dropping* the cell into its *Components*.

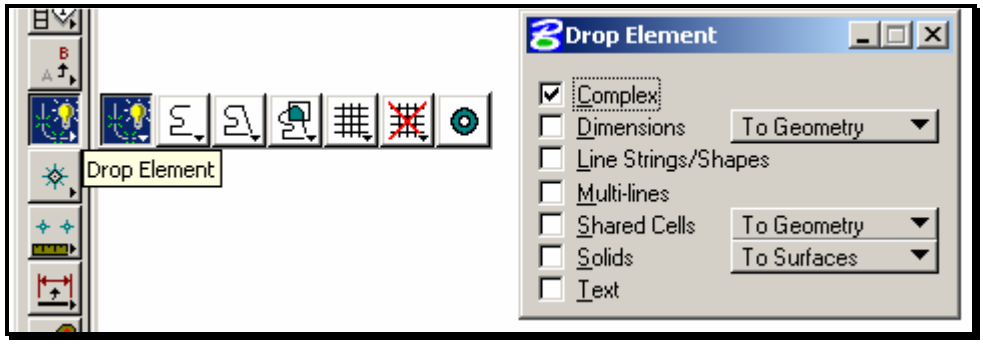


Figure 9-45: Drop Element Tool Settings

From the **Main Tool Frame**, pick **Drop Element**. Look at your **Tool Settings Window** and make sure that **Complex** is turned on (Figure 9-45). MicroStation will prompt you to "Identify Element." Pick on the Curve Data Cell. It will highlight, and you will *Accept* with a *Data Point* to complete the *Drop*.

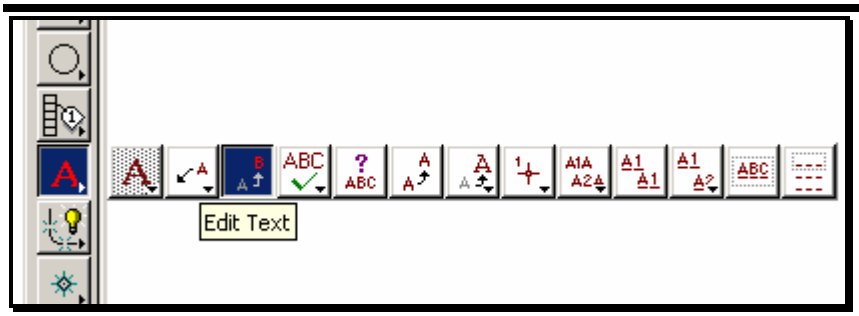


Figure 9-46: Edit Text Button

Once the Curve Data has been dropped, use your *Edit Text* tool to change the values to reflect your current curve (Figure 9-46).

RESOURCES

ROW FUNCTION KEYS

F1	Flatten Flattens your active file to 0 elevation
F2	Window in
F3	Zoom Out
F4	Update View
F5	*Powerselector*
F6	Fence
F7	*Accudraw* On/Off
F8	Set Angle Mode to Conventional
F9	Set Angle Mode to Bearing
F10	Distance Macro measures along element and gives you options on how you can label distances.
F11	Perpendicular Snap
F12	Construct Point at Distance and Offset
Alt+F1	Works similar to a refresh/ clear
Alt+ F2	Acre/square Feet Macro Automatically changes Square meters to feet or acres and places on your pointer.
Alt+ F3	/actan2 changes your active angle with 2 hit points for placing text.
Alt+ F4	Reserved for Closing Windows/Files
Alt+ F5	Copy Parallel & Change Attributes (Color, Style, Level, Etc.)
Alt+ F6	
Alt+ F7	
Alt+ F8	
Alt+ F9	
Alt+ F10	
Alt+ F11	
Alt+ F12	Copy Parallel
Shift+F1	
Shift+ F2	
Shift+ F3	

Shift+ F4	
Shift+ F5	
Shift+ F6	
Shift+ F7	
Shift+ F8	
Shift+ F9	
Shift+ F10	
Shift+ F11	
Shift+ F12	
Ctrl+F1	
Ctrl+ F2	
Ctrl+ F3	
Ctrl+ F4	
Ctrl+ F5	
Ctrl+ F6	
Ctrl+ F7	
Ctrl+ F8	
Ctrl+ F9	
Ctrl+ F10	
Ctrl+ F11	
Ctrl+ F12	Move Parallel